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## Taxonomic and Ecological Studies in the Family Parholaspidae (Acari, Mesostigmata) from Japan

(Part 3)

By

**Kazuo ISHIKAWA**

Biological Laboratory, Matsuyama Shinonome Junior College, Matsuyama

(Communicated by Tadashige HABE)

This is the third and final part of my paper on the taxonomy of parholaspid mites and deals with the genera *Gamasholaspis*, *Parholaspis* and *Euparholaspulus*. I originally intended to include zoogeography and ecology of parholaspid mites in this paper, but have decided to exclude those sections which are to be published in a forthcoming number of the Reports of Research at the Matsuyama Shinonome Junior College.

### Genus *Gamasholaspis* BERLESE

*Gamasholaspis* BERLESE, 1904, *Redia*, 1: 265.

Dorsal shield reticulated, with twenty-nine pair of simple, sickle-like or lanceolate setae, seta M1 lacking. Anterior margin of dorsal shield slightly rounded. Sternal shield strongly sclerotized and with three pair of simple setae. Metasternal shields free. Epigynial shield usually not fused with ventri-anal or endopodal shield, with or without perigenital rim. Ventri-anal shield with four pair of preanal setae, and not fused with podal and peritrematal shields. Holoventral shield present in male. Epistome forming a serrated median process. Chelicera chelate-dentate; dorsal seta on fixed digit wedge-shaped. Corniculus longer than movable digit of chelicera. Leg I with or without claws.

Type-species: *Holostaspis (Gamasholaspis) gamasoides* BERLESE.

### Key to the Species

1. Dorsal setae simple ..... 2
- Dorsal setae sickle-shaped ..... 4
2. Tarsus I without claws and pulvilli ..... *G. akimotoi* (ISHIKAWA)
- Tarsus I with small claws and pulvilli ..... 3
3. Ventri-anal shield longer than wide ..... *G. asiaticus* PETROVA

- Ventri-anal shield wider than long..... *G. communis* PETROVA
- 4. Length of idiosoma longer than 700  $\mu$ ; femur II with knobbed spur ventrally.....  
..... *G. browningi* (BREGETOVA et KOROLEVA)
- Length of idiosoma less than 700  $\mu$ ; femur II without spur..... 5
- 5. Ventri-anal shield fused with podal and peritrematal shields; expulsory vesicles elongate..... *G. pygmaeus* sp. nov.
- Ventri-anal shield fused with neither podal nor peritrematal shield; expulsory vesicle normal..... *G. serratus* sp. nov.

***Gamasholaspis akimotoi* (ISHIKAWA)**

[Japanese name: Akimoto-kamagehokodani]

(Figs. 117-120)

*Parholaspulus akimotoi* ISHIKAWA, 1966, Rept. Res. Matsuyama Shinonome Junior Coll., 2: 106.

*Additional specimens examined.* Hokkaido — 1 ♀, Akan, Hokkaido, 17-X-1962, G. IMADATÉ. Honshu — 1 ♀, Biwaike, Shiga Highlands, Nagano Pref., 26-VIII-1968, K. ISHIKAWA; 1 ♀, Managashi, Nagano Pref., 4-VI-1968, K. I. Shikoku — 1 ♀, ex litter of mixed forest, Namekawa, Kawauchi, Ehime Pref., 21-VIII-1968, K. I.; 3 ♀♀, Mt. Dôzan-mine, Ehime Pref., 28-V-1969, K. I.; 5 ♀♀, Ishii, Tokushima Pref., 12-IV-1969, M. SAKAI.

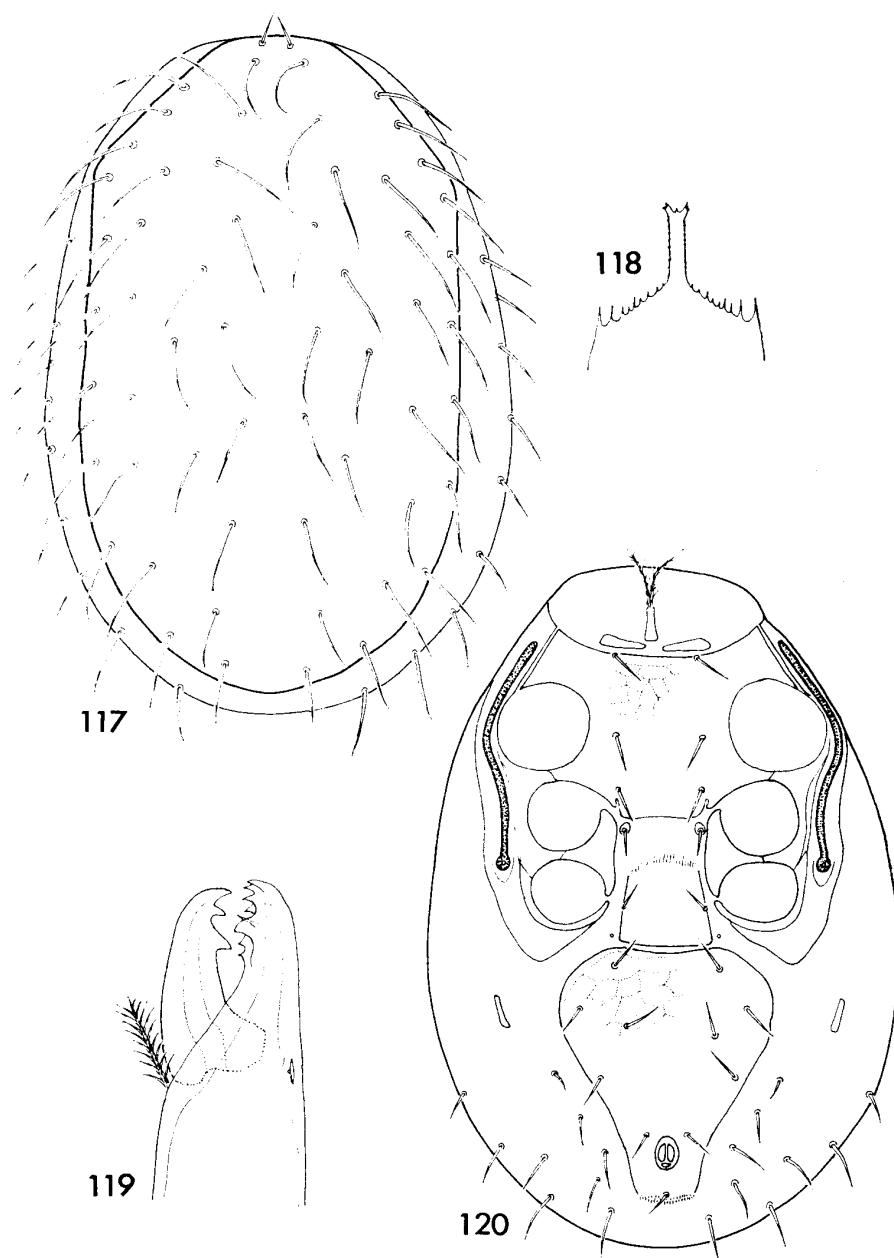
*Female.* Length of idiosoma: av. 593  $\mu$ ; length of dorsal shield 485-590  $\mu$ , av. 547  $\mu$ ; width of dorsal shield at the level of coxae IV 248-375  $\mu$ , av. 310  $\mu$ .

*Dorsum.* Dorsal shield weakly reticulated, with the anterior margin slightly rounded. Dorsal shield provided with twenty-nine pair of simple setae; setae M1 absent. The distribution of setae is as shown in Fig. 117. Length of setae: verticals 17  $\mu$ , D2 67  $\mu$ , D3-D4, 79  $\mu$ , D5 77  $\mu$ , D10 56  $\mu$  and humerals 79  $\mu$ .

*Venter.* Tritosternum well developed, with a pair of pilose laciniae more than twice the length of tritosternal base. Presternal shields composed of a pair of narrow platelets. Sternal shield reticulated, and partially fused with exopodal shields, and with three pair of simple setae and two pair of pores. Metasternal shields free, with a pair of simple setae and pores. Epigynial shield reticulated and with a pair of simple setae. Ventri-anal shield reticulated, and with four pair of preanal setae and three perianal setae. Metapodal shield narrow, located lateral to preanal setae II. Stigmata lying on the antero-lateral angles of coxae IV. Peritremes extending to coxae I; peritrematal shield partially fused with exopodal shields.

*Gnathosoma.* Epistome with a serrated median projection, and flanked on each side by a small spined protuberance. Pedipalp five-segmented; palpal apotele with three tines, two of which are distally spatulate. Fixed digit of chelicera with four teeth, while movable digit (51  $\mu$ ) with two teeth and considerably shorter than corniculus (64  $\mu$ ). Dorsal seta on fixed digit wedge-shaped.

*Legs.* Tarsus I without claws and pulvilli; tarsi II to IV each with well developed



Figs. 117-120. *Gamasholaspis akimotoi* (ISHIKAWA), female. — 117. Dorsum. — 118. Epistome. — 119. Chelicera. — 120. Venter.

claws and pulvilli; tarsus II with a pair of strong spines on the distal part. Tarsus I (92  $\mu$ ) much longer than tibia I (67  $\mu$ ). Length of leg I 468  $\mu$ , II 452  $\mu$ , III 331  $\mu$  and IV 495  $\mu$ .

*Male.* Unknown.

*Known distribution.* Hokkaido, Honshu, Shikoku (type-locality).

*Remarks.* This species was originally placed in the genus *Parholaspulus* by the

present author (1966). However, a careful re-examination of the type material revealed that it belongs to the genus *Gamasholaspis* BERLESE on account of the absence of the dorsal setae M1 and the condition of the movable digit of chelicera which is shorter than corniculus.

***Gamasholaspis asiaticus* PETROVA**

[Japanese name: Ajia-kamagehokodani]

(Figs. 121-126)

*Gamasholaspis asiaticus* PETROVA, 1967, Biull. Mosk. Obshch. Ispyt. Prir., (Biol.), 72 (2): 46; PETROVA, 1977, Opredelitel' obitaiushchikh v pochve kleshchei Mesostigmata, p. 340.

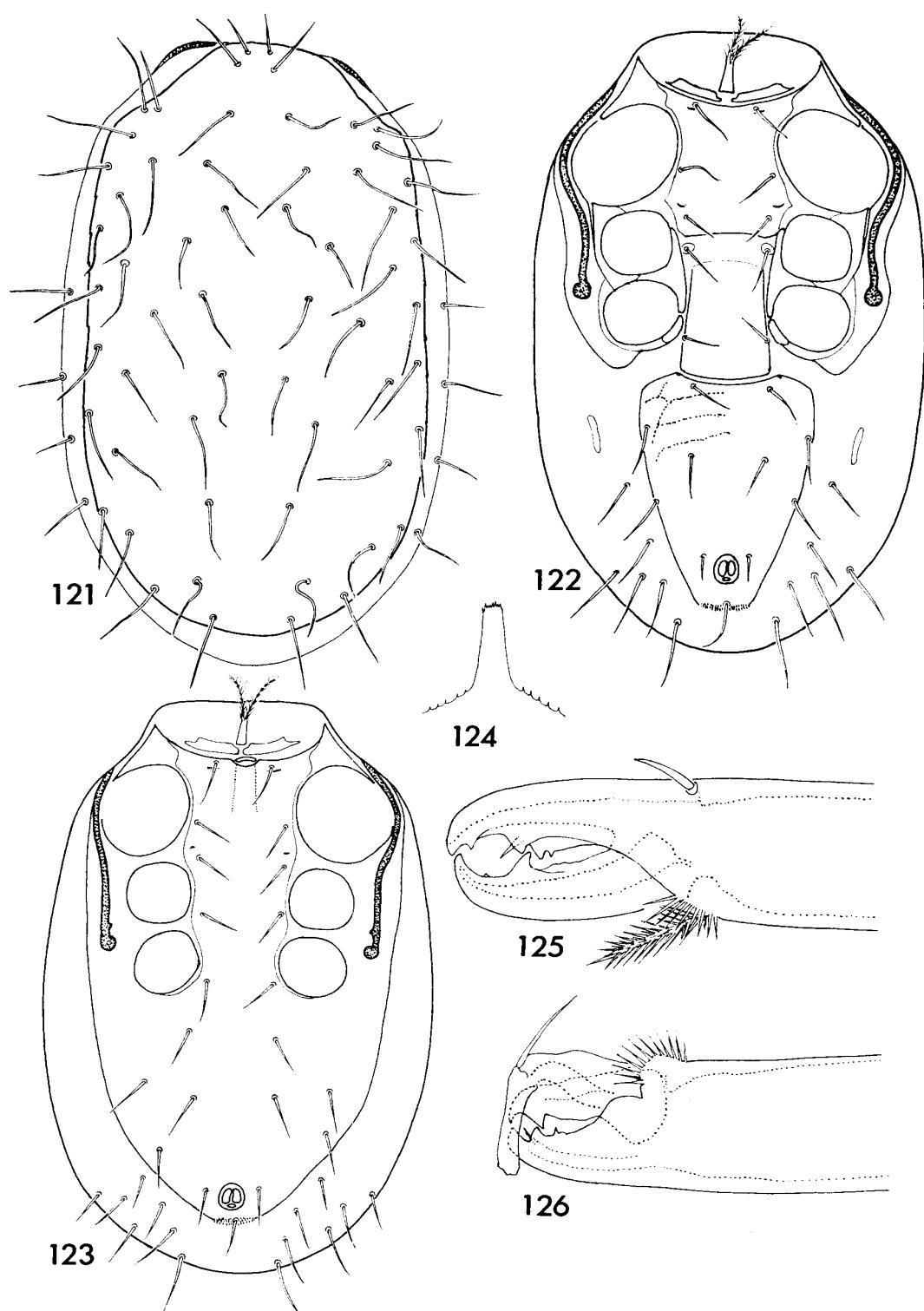
*Specimens examined.* Honshu — 2 ♀♀, ex litter of *Camellia japonica* L., Ise, Mie Pref., 28-II-1969, K. ISHIKAWA; 1 ♂, Kusatsu, Gunma Pref., 23-VIII-1968, K. I.; 1 ♀, Mt. Shiga, Nagano Pref., 19-X-1967, 1 ♀, 3-VI-1968, K. I.; etc. Shikoku — 2 ♀♀, 1 ♂, Kyōgamori, Matsuyama, 24-IV-1965, 1 ♂, 29-V-1967, K. I.; 1 ♀, Sugitate, Matsuyama, 21-VI-1966, K. I.; 1 ♀, Kurotaki, Tanbara, Ehime Pref., 13-IV-1968, K. OKUDA; 1 ♀, ex litter of *Fagus crenata*, Ryūjin-taira, Mt. Saragamine, Ehime Pref., 23-VI-1968, K. I.; 1 ♀, Shimotsuike, Saijō, Ehime Pref., 29-VI-1968, K. I.; 2 ♀♀, Godan-kōgen, Ehime Pref., 3-XI-1963, K. I.; 3 ♀♀, Mt. Narabara, Ehime Pref., 23-XI-1968, K. I.; 1 ♀, Yuyaguchi, Tanbara, 1-XII-1968, Y. ISHIKAWA; 1 ♂, Yuyama, Matsuyama, 24-III-1969, M. IKI; 1 ♀, ex litter of *Chamaecyparis obtusa* ENDLICHER, Omogo Valley, Ehime Pref., 14-VIII-1969, K. I.; 1 ♀, 1 ♂, Mt. Ishizuchi, 8-VI-1969, K. I.; 2 ♀♀, Mt. Shiratsue, 8-XII-1968, K. I.; 1 ♀, ex decaying wood of *Castanopsis cuspidata*, Mt. Bizan, Tokushima City, 7-IV-1969, M. YOSHIDA. Kyushu — 1 ♂, Nagasaki City, 15-IX-1969, N. HIRAMATSU.

*Female.* Length of idiosoma: av. 906  $\mu$ ; length of dorsal shield 785-896  $\mu$ , av. 852  $\mu$ ; width of dorsal shield at the level of coxae IV 417-524  $\mu$ , av. 462  $\mu$ .

*Dorsum.* Dorsal shield weakly reticulated, with the anterior margin slightly rounded. Dorsal shield bearing twenty-nine pair of long simple setae; setae M1 absent. Length of setae: verticals 36  $\mu$ , D2 90  $\mu$ , D3 121  $\mu$ , D4 128  $\mu$ , D5 100  $\mu$ , D10 103  $\mu$  and humerals 113  $\mu$ .

*Venter.* Tritosternum well developed, with a pair of pilose laciniae. Pre-seternal shields well developed, composed of a pair of large platelets. Sternal shield reticulated and partially fused with endopodal shield, bearing three pair of simple setae and two pair of pores. Metasternal shields free, and with a pair of setae and pores. Epigynial shield reticulated and with a pair of long simple setae. Ventri-anal shield with four pair of preanal setae and three perianal setae. Metapodal shields elongate, located lateral to preanal setae II. Stigmata situated near the antero-lateral angles of coxae IV. Peritremes well developed and extending anteriorly beyond coxae I; peritrematal shields partially fused with exopodal shields.

*Gnathosoma.* Epistome forming a serrated median projection, and flanked



Figs. 121-126. *Gamasholaspis asiaticus* PETROVA (121-122, 124-125 female; 123, 126 male).  
— 121. Dorsum. — 122-123. Venter. — 124. Epistome. — 125-126. Chelicera.

on either side by a protuberance. Pedipalp five-segmented; palpal apotele with three tines, two of which are distally spatulate. Fixed digit of chelicera with four teeth, while movable digit (92  $\mu$ ) with a large and a small teeth, and considerably shorter than corniculus (100  $\mu$ ). Dorsal setae on fixed digit wedge-shaped.

**Legs.** Tarsus I with small claws and pulvilli; tarsi II to IV with well developed claws and pulvilli; tarsus II with a series of strong spines on the distal portion. Tarsus I (180  $\mu$ ) much longer than tibia I (123  $\mu$ ). Length of leg I 687  $\mu$ , II 670  $\mu$ , III 512  $\mu$  and IV 750  $\mu$ .

**Male.** Length of idiosoma: av. 804  $\mu$ ; length of dorsal shield 751–794  $\mu$ , av. 770  $\mu$ ; width of dorsal shield at the level of coxae IV 405–445  $\mu$ , av. 422  $\mu$ . The chaetotaxy and ornamentation of dorsal shield are basically the same as in female. Genital orifice located on the anterior margin of sternal shield. Holoventral shield anterior to coxae IV, and with five pair of simple setae; its posterior area with four pair of long simple setae and three perianal setae. Fixed digit of chelicera chelate-dentate; movable digit with a single tooth and a sperm transfer organ. Femur II with a stout thumb-like apophysis; a small spine located on genu II, tibia II as well as tarsus II. Length of leg I 620  $\mu$ , II 589  $\mu$ , III 437  $\mu$  and IV 706  $\mu$ .

**Known distribution.** Soviet Far East.

**Remarks.** This species was originally described by PETROVA (1967) from the Soviet Far East. However, it has recently been collected from Shikoku, Kyushu and Honshu. This is the first record outside of the Soviet Far East.

### *Gamasholaspis communis* PETROVA

[Japanese name: Karafuto-kamagehokodani]

(Figs. 127–130)

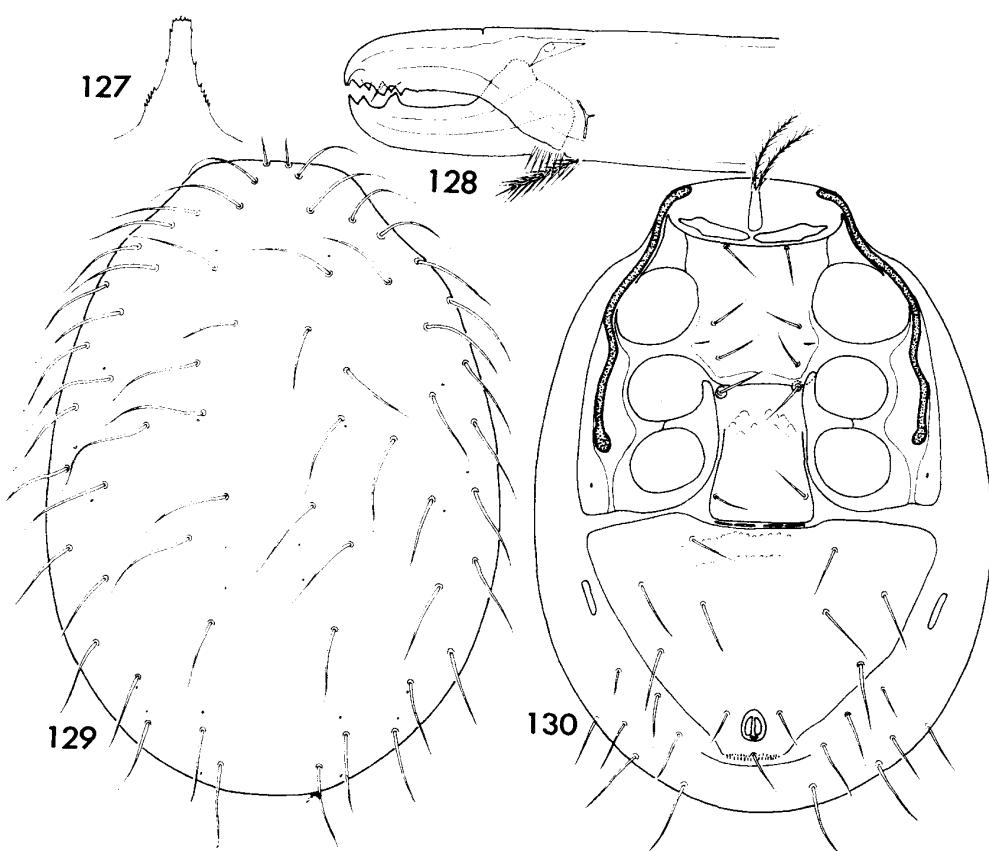
*Gamasholaspis communis* PETROVA, 1967, Biull. Mosk. Obshch. Ispyt. Prir., (Biol.) 72 (2): 46; PETROVA, 1977, Opredelitel' obitaiushchikh v pochve kleshchei Mesostigmata, p. 343.

**Specimens examined.** Honshu — 1 ♀, ex litter of oak, Fukiage-gyoen, Tokyo, 21–V–1975, J. AOKI. Tsushima Islands — 2 ♀♀, ex litter of *Chamaecyparis obtusa*, Oomasu, Kamiagata, Tsushima Is., 16–X–1968, J. AOKI.

**Female.** Length of idiosoma av. 859  $\mu$ ; length of dorsal shield 825  $\mu$ , 840  $\mu$ , 850  $\mu$ ; width of dorsal shield at the level of coxae IV 510  $\mu$ , 553  $\mu$ , 560  $\mu$ .

**Dorsum.** Dorsal shield weakly reticulated, with the anterior margin slightly rounded. Dorsal shield provided with twenty-nine pair of long simple setae; setae M1 absent. The distribution of setae is as shown in Fig. 129. Length of setae: verticals 43  $\mu$ , D2 75  $\mu$ , D3 120  $\mu$ , D4 125  $\mu$ , D5 110  $\mu$ , D6 120  $\mu$ , D11 122  $\mu$  and humerals 125  $\mu$ .

**Venter.** Triosternum with pilose laciniae longer than tritosternal base. Pre-sternal shields composed of a pair of large platelets. Sternal shield partially fused with endopodal shields, bearing three pair of simple setae and two pair of pores.



Figs. 127-130. *Gamasholaspis communis* PETROVA, female. — 127. Epistome. — 128. Chelicera. — 129. Dorsum. — 130. Venter.

Metasternal shields free, and with a pair of setae and pores. Epigynial shield wedge-shaped and with a pair of simple setae. Ventri-anal shield subtriangular, reticulated, and bearing four pair of preanal and three perianal setae. Metapodal shield elongate, located lateral to preanal setae II. Stigmata located near the antero-lateral angles of coxae IV. Peritremes extending beyond coxae I; peritrematal shield partially fused with exopodal shields.

**Gnathosoma.** Epistome forming a serrated median projection; lateral elongate projections absent. Pedipalp five-segmented; palpal tarsus with three-tined palpal apotele. Fixed digit of chelicera with six teeth, while movable digit (75  $\mu$ ) with a large and a small teeth, and much shorter than corniculus (102  $\mu$ ). Dorsal seta on fixed digit wedge-shaped.

**Legs.** Tarsus I with small claws and pulvilli, while tarsi II to IV each with well developed claws and pulvilli. Tarsus II with a stout spine on the distal portion. Tarsus I (102  $\mu$ ) much longer than tibia I (158  $\mu$ ). Length of leg I 607  $\mu$ , II 560  $\mu$ , III 465  $\mu$  and IV 746  $\mu$ .

**Known distribution.** Eastern Siberia.

**Remarks.** This species has hitherto been recorded only from Eastern Siberia; it is

very rarely found in Japan.

***Gamasholaspis browningi* (BREGETOVA et KOROLEVA)**

[Japanese name: Kamagehokodani]

(Figs. 131–136)

*Evansolaspis browningi* BREGETOVA et KOROLEVA, 1960, Parazit. sbor. zool. SSSR, 19: 54.

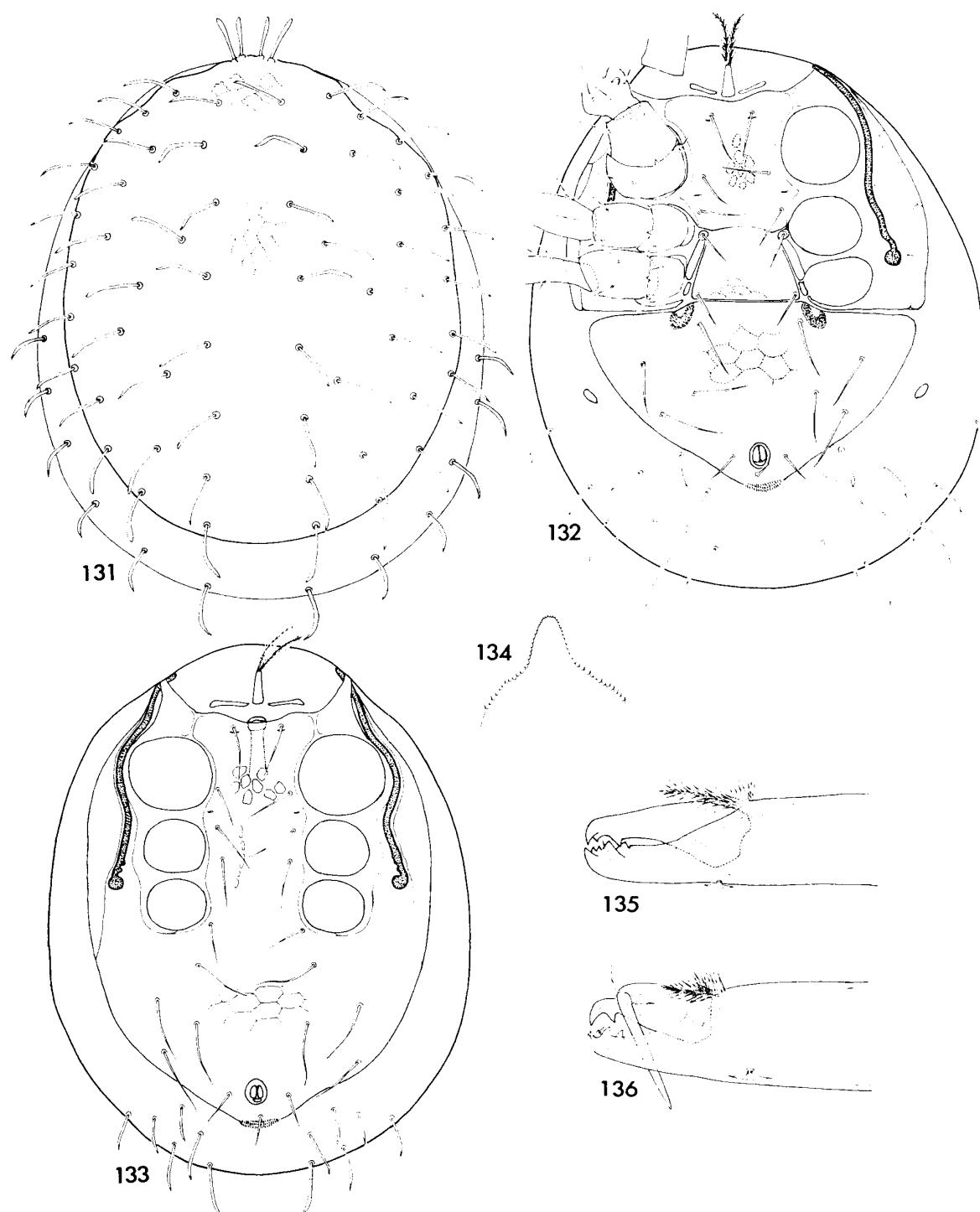
*Gamasholaspis browningi*: PETROVA, 1967, Biull. Mosk. Obshch. Ispyt. Prir., (Biol.), 72 (2): 44; BREGETOVA & KOROLEVA, 1977, Opredelitel' obitaiushchikh v pochve kleshchei Mesostigmata, p. 338.

*Specimens examined.* Hokkaido — 3 ♀♀, Akan, 17–X–1962, G. IMADATÉ. Honshu — 1 ♀, Hagi, Yamaguchi Pref., 15–X–1968, N. KUBO; 1 ♀, Chizu, Yazu, Tottori Pref., 1–XI–1968, M. YONEI; 1 ♀, Mt. Hakusan, Gifu Pref., 19–V–1967, M. TANAKA; 2 ♀♀, 1 ♂, Mt. Shiga, Nagano Pref., 4–VI–1968, K. ISHIKAWA. Shikoku — 1 ♀, ex litter of *Pinus densiflora* SIEBOLD et ZUCCARINI, Matsuyama, Ehime Pref., 9–III–1966, K. I.; 3 ♀♀, ex vegetable manure, Kuwabara, Matsuyama, 14–I–1966, K. I.; 1 ♀, ex litter of mixed grove, Sugitate, Matsuyama, 21–IV–1966, K. I.; 1 ♀, Omogo Valley, 4–VII–1966, N. AKIMOTO, 1 ♀, 28–IV–1968, T. NAKAGAWA; 2 ♀♀, Hoino, Shūsō-gun, Ehime Pref., 5–XI–1967, K. I.; 2 ♀♀, Kuromori-tōge, Ehime Pref., 16–VI–1968, K. I.; 1 ♀, Namekawa, Kawauchi, Ehime Pref., 21–VII–1968, K. I.; 1 ♀, Shimotsuike, Saijō, Ehime Pref., 29–VI–1968, K. I.; 5 ♀♀, ex litter of *Pinus thunbergii*, Kashima Is., Hōjō, Ehime Pref., 9–VII–1968, K. I.; 3 ♀♀, Mt. Narabara, Ochi, Ehime Pref., 23–XI–1968, K. I.; 2 ♀♀, ex litter of *Castanopsis cuspidata*, Mishima-jinja, Kyōgamori, Matsuyama, 6–XII–1968, K. I.; 1 ♀, 3 ♂♂, Misaki-chō, Nishiwa, Ehime Pref., 16–III–1969, K. KIMURA; 1 ♀, 1 ♂, Mt. Ishizuchi, Ehime Pref., 7–VIII–1969, K. I.; 4 ♀♀, Ishii, Tokushima Pref., 12–IV–1969, M. SAKAI; 2 ♀♀, Mt. Kinobe, Ishii, Tokushima Pref., 23–IV–1969, M. YOSHIDA. Kyushu — 5 ♀♀, Cape Sata-misaki, Kagoshima Pref., 9–IV–1969, T. FUNAGUMA; 1 ♀, Nagasaki City, Nagasaki Pref., 15–IX–1969, N. HIRAMATSU; 1 ♀, Amakusa, Kumamoto Pref., 10–I–1964, M. TANAKA.

*Female.* Length of idiosoma: av. 802  $\mu$ ; length of dorsal shield 687–785  $\mu$ , av. 734  $\mu$ ; width of dorsal shield at the level of coxae IV 493–576  $\mu$ , av. 530  $\mu$ .

*Dorsum.* Dorsal shield strongly reticulated throughout, with the anterior margin rounded. Dorsal shield bearing twenty-nine pair of sickle-like setae; setae M1 absent. The distribution of setae is as shown in Fig. 131. Length of setae: verticals 64  $\mu$ , D2 74  $\mu$ , D3, D4 77  $\mu$ , D5 67  $\mu$ , D10 85  $\mu$  and humerals 82  $\mu$ .

*Venter.* Tritosternum well developed, with a pair of pilose laciniae which are more than twice as long as tritosternal base. A pair of narrow presternal shields present flanking the tritosternal base. Sternal shield strongly reticulated, partially fused with endopodal shield, and provided with three pair of sternal setae and two pair of pores. Metasternal shield free (sometimes coalesced with endopodal shield or



Figs. 131–136. *Gamasholaspis brownningi* (BREGETOVA et KOROLEVA) (131–132, 134–135 female; 133, 136 male). — 131. Dorsum. — 132. 133. Venter. — 134. Epistome. — 135–136. — Chelicera.

perigenital rim), and with a pair of long simple setae and pores. Epigynial shield reticulated, rounded anteriorly and truncate posteriorly, and with a pair of long simple setae on the postero-lateral corners; perigenital rim present. Ventri-anal shield reticulated, subtriangular, and with four pair of preanal and three perianal setae. Expulsive vesicles located posterior to coxae IV. Metapodal shields distinct, located lateral to preanal setae II. Stigmata situated near the antero-lateral angles of coxae IV. Peritremes extending beyond coxae I; peritrematal shield partially fused with exopodal shield.

**Gnathosoma.** Epistome forming a serrated median projection and flanked on each side by a protuberance; lateral elongate projections absent. Pedipalp five-segmented; palpal tarsus with three-tined palpal apotele. Fixed digit of chelicera with four teeth, while movable digit (75  $\mu$ ) with a large and a small teeth, and much shorter than corniculus (128  $\mu$ ). Dorsal seta on fixed digit wedge-shaped.

**Legs.** Tarsus I with neither claws nor pulvilli; tarsi II to IV each with well developed claws and pulvilli. Tarsus I (189  $\mu$ ) about twice as long as tibia I (95  $\mu$ ). Tarsus II without spine. Femur II, femur III and trochanter IV each provided with a spur ventrally. Length of leg I 564  $\mu$ , II 570  $\mu$ , III 517  $\mu$  and IV 713  $\mu$ .

**Male.** Length of idiosoma: av. 672  $\mu$ ; length of dorsal shield 631–695  $\mu$ , av. 654  $\mu$ ; width of dorsal shield at the level of coxae IV 445–530  $\mu$ , av. 471  $\mu$ .

The chaetotaxy and ornamentation of dorsal shield are essentially the same as in female. Genital orifice situated on the anterior margin of sternal shield. Holoventral shield bearing nine pair of simple setae and three perianal ones. Fixed digit of chelicera chelate-dentate; movable digit with a single tooth and a sperm transfer organ. Femur II with a stout thumb-like apophysis; genu and tibia II each with a small spine. Length of leg I 493  $\mu$ , II 520  $\mu$ , III 462  $\mu$  and IV 617  $\mu$ .

**Known distribution.** Eastern Siberia.

**Remarks.** This species was originally described by BREGETOVA and KOROLEVA (1960) from Eastern Siberia as a member of the genus *Evansolaspis*. It is common and widely distributed in Japan.

#### *Gamasholaspis pygmaeus* sp. nov.

[Japanese name: Hime-kamagehokodani]

(Figs. 137–140)

**Type-series.** Holotype ♀ (NSMT-Ac 9307): ex litter of *Quercus acutissima*, Sugitate, Matsuyama, Ehime Pref., 21–VI–1966, K. ISHIKAWA. Paratypes: Shikoku — 1 ♀, the same data as holotype; 1 ♀, Okinoshima Is., Sukumo, Kōchi Pref., 16–II–1969, N. TANIGAWA.

**Female.** Length of idiosoma av. 410  $\mu$ , length of dorsal shield 375  $\mu$ , 381  $\mu$ , 385  $\mu$ , width of dorsal shield at the level of coxae IV ca. 270  $\mu$ .

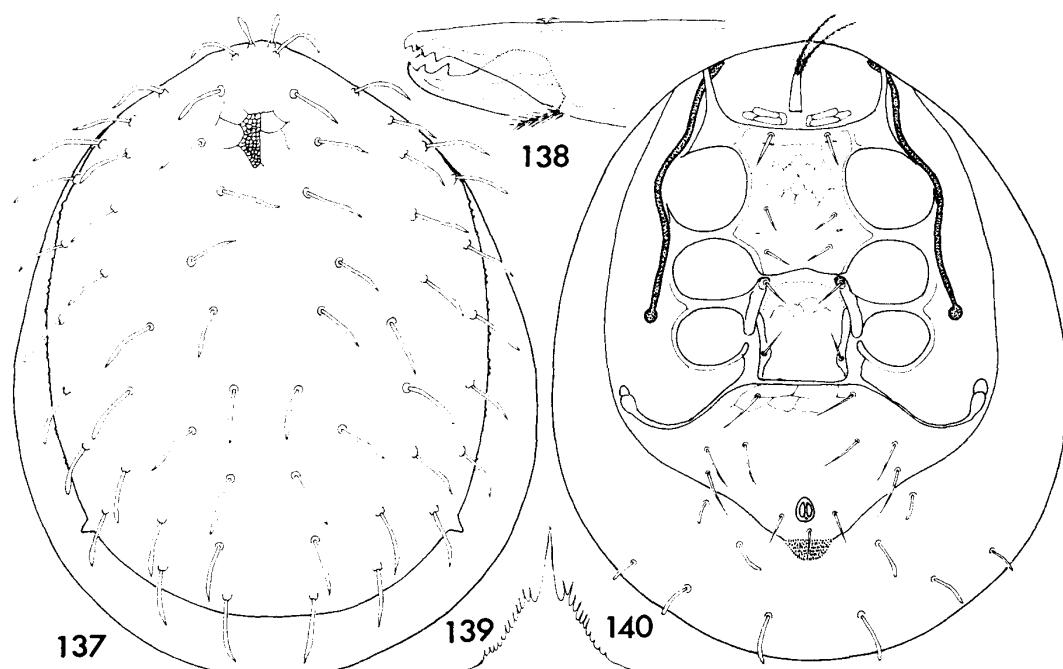
**Dorsum.** Dorsal shield sclerotized and ornamented with punctations and re-

ticulations. Postero-lateral portion provided with a pair of conical projections. Dorsal shield bearing twenty-nine pair of sickle-like setae; setae M1 absent. The distribution of setae is as shown in Fig. 137. Length of setae: verticals 22  $\mu$ , D2 37  $\mu$ , D3 39  $\mu$ , D4 D5, 35  $\mu$ , D6 32  $\mu$ , D11 37  $\mu$  and humerals 40  $\mu$ .

**Venter.** Tritosternum well developed, with a pair of pilose laciniae which are about three times as long as tritosternal base. Presternal shields consisting of a pair of large platelets. Sternal shield reticulated, partially fused with endopodal shields, bearing three pair of simple setae, of which the setae I are much longer than the others. Metasternal shields free, and with a pair of setae and pores. Epigynial shield reticulated, and with a pair of simple setae on the postero-lateral corners; perigenital rim present. Ventri-anal shield fused with podal and peritrematal shields, and provided with four pair of simple setae and three perianal setae. Expulsive vesicles elongate and situated posterior to peritrematal shields. Metapodal shields located lateral to preanal setae II. Stigmata situated near the antero-lateral angles of coxae IV. Peritremes extending to coxae I; peritrematal shield partially fused with exopodal and ventri-anal shields.

**Gnathosoma.** Epistome with a sharply pointed median projection and spinose anterior margin. Pedipalp five-segmented; palpal tarsus with three-tined palpal apotele. Fixed digit of chelicera with two small teeth and a pilus dentilis, while movable digit (35  $\mu$ ) with a large and a small teeth, and much shorter than corniculus (57  $\mu$ ). Dorsal setae on fixed digit wedge-shaped.

**Legs.** Tarsus I with neither claws nor pulvilli; tarsi II to IV each with well



Figs. 137-140. *Gamasholaspis pygmaeus* sp. nov., female. — 137. Dorsum. — 138. Chelicera. — 139. Epistome. — 140. Venter.

developed claws and pulvilli. Tarsus I ( $85\ \mu$ ) about twice as long as tibia I ( $43\ \mu$ ). Legs II, III and IV without spur. Length of leg I  $267\ \mu$ , II  $255\ \mu$ , III  $237\ \mu$  and IV  $270\ \mu$ .

*Male.* Unknown.

*Remarks.* The present species is an indubitable member of *Gamasholaspis* in view of the absence of the dorsal setae M1, but it is clearly distinguished from the other species of the genus by the presence of the ventri-anal shield fused with podal and peritrematal shields and the projections of the postero-lateral dorsal shield.

*Gamasholaspis serratus* sp. nov.

[Japanese name: Marunoko-kamagehokodani]

(Figs. 141-144)

*Type-series.* Holotype ♀ (NSMT-Ac 9308): ex litter of *Celtis sinensis* PERS. var. *japonica* (PLANCH.), Kuwabara, Matsuyama, Ehime Pref., 31-XII-1968, K. ISHIKAWA. Paratypes: Honshu — 2 ♀♀, Shizumo, Nagiso, Nagano Pref., 20-VIII-1968, K. I. Shikoku — 1 ♀, the same data as holotype; 2 ♀♀, Mt. Takanawa, Ehime Pref., 22-V-1968, K. I.; 1 ♀, ex litter of *Abies firma* and *Tsuga sieboldii*, Mt. Omogo, Ehime Pref., 9-VIII-1969, K. I.; 1 ♀, Mt. Bizan, Tokushima Pref., 7-IV-1969, M. YOSHIDA. Kyushu — 1 ♀, Minamata, Kumamoto Pref., 9-V-1968, M. TANAKA; 2 ♀♀, Oonaminoike, Mt. Kirishima, Kagoshima Pref., 25-VII-1971, K. I.

*Female.* Length of idiosoma av.  $380\ \mu$ ; length of dorsal shield  $265$ – $390\ \mu$ , av.  $376\ \mu$ ; width of dorsal shield  $255$ – $270\ \mu$ , av.  $266\ \mu$ .

*Dorsum.* Dorsal shield sclerotized and reticulated; its margins serrated. Dorsal shield bearing twenty-nine pair of sickle-like setae; setae M1 absent. The distribution of setae as shown in Fig. 141. Length of setae: verticals  $23\ \mu$ , D2  $25\ \mu$ , D3  $30\ \mu$ , D4  $35\ \mu$ , D5  $34\ \mu$ , D6  $33\ \mu$ , D11  $35\ \mu$  and humerals  $35\ \mu$ .

*Venter.* Tritosternum well developed, with a pair of pilose laciniae much longer than tritosternal base. Presternal shields consisting of a pair of narrow platelets. Sternal shield reticulated, partially fused with endopodal shields, bearing three pair of simple setae, of which the setae I are much longer than the others. Metasternal shields free, with a pair of setae and pores. Epigynial shield wedge-shaped, and with a pair of simple setae on the postero-lateral corners; perigenital rim present. Ventri-anal shield reticulated, subtriangular and with four pair of simple preanal and three perianal setae. Expulsive vesicles located posterior to coxae IV. Metapodal shields located lateral to preanal setae II. Stigmata situated near the antero-lateral angles of coxae IV. Peritremes extending to coxae I; peritrematal shield partially fused with exopodal shields.

*Gnathosoma.* Epistome forming a serrated median projection. Pedipalp five-segmented; palpal apotele with three tines. Fixed digit of chelicera with three teeth and a pilus dentilis; movable digit ( $33\ \mu$ ) bidentate, and much shorter than

corniculus (62  $\mu$ ). Dorsal setae on fixed digit wedge-shaped.

**Legs.** Tarsus I with neither claws nor pulvilli; tarsi II to IV each with well developed claws and pulvilli. Tarsus I (70  $\mu$ ) approximately as long as tibia I. Each leg without spur. Length of leg I 280  $\mu$ , II 273  $\mu$ , III 235  $\mu$  and IV 360  $\mu$ .

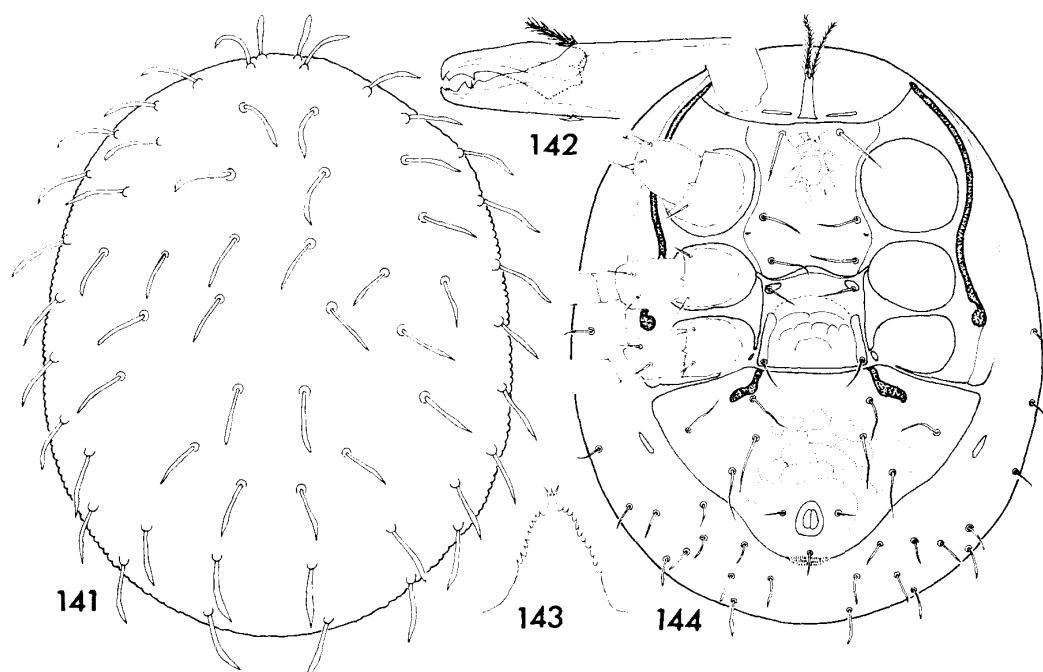
**Male.** Unknown.

**Remarks.** Although the present species resembles *Gamasholaspis linae* PETROVA, 1977, from the Soviet Far East, the latter has the following characteristics: size large (length of idiosoma 640–660  $\mu$ ); dorsal shield not serrated in outline.

#### Genus *Parholaspis* BERLESE

*Parholaspis* BERLESE, 1918, *Redia*, 13: 174.

Dorsal shield with thirty pair of lanceolate setae, of which the setae M1 are spine-like in some species; setae M1 shorter than D1. Anterior margin of dorsal shield gently rounded. Sternal shield free and with three pair of simple setae. Metasternal shields free from sternal or endopodal shields. Epigynial shield large, not fused with podal or ventri-anal shields. Ventri-anal shield bearing four pair of preanal setae. Metapodal shields distinct. The male has a holoventral shield and genital orifice located on the anterior margin of holoventral shield. Epistome provided with elongate median extension and several short projections on either side. Chelicera chelate-dentate; movable digit longer than corniculus; dorsal seta on fixed digit simple.



Figs. 141–144. *Gamasholaspis serratus* sp. nov., female. — 141. Dorsum. — 142. Chelicera. — 143. Epistome. — 144. Venter.

Chelicera in male with a sperm transfer organ. Leg I with or without claws. Legs II to IV each with well developed claws. Legs II spurred in male.

Type-species: *Parholaspis desertus* BERLESE.

### Key to the Species

1. Tarsus I provided with claws and pulvilli; ventri-anal shield with four pair of preanal setae; presternal shield present..... *P. mordax* PETROVA.
- Tarsus I with neither claws nor pulvilli; ventri-anal shield with five pair of preanal setae; presternal shield not conspicuous..... *P. meridionalis* sp. nov.

#### *Parholaspis mordax* PETROVA

[Japanese name: Petrova-yarigehokodani]

(Figs. 145–152)

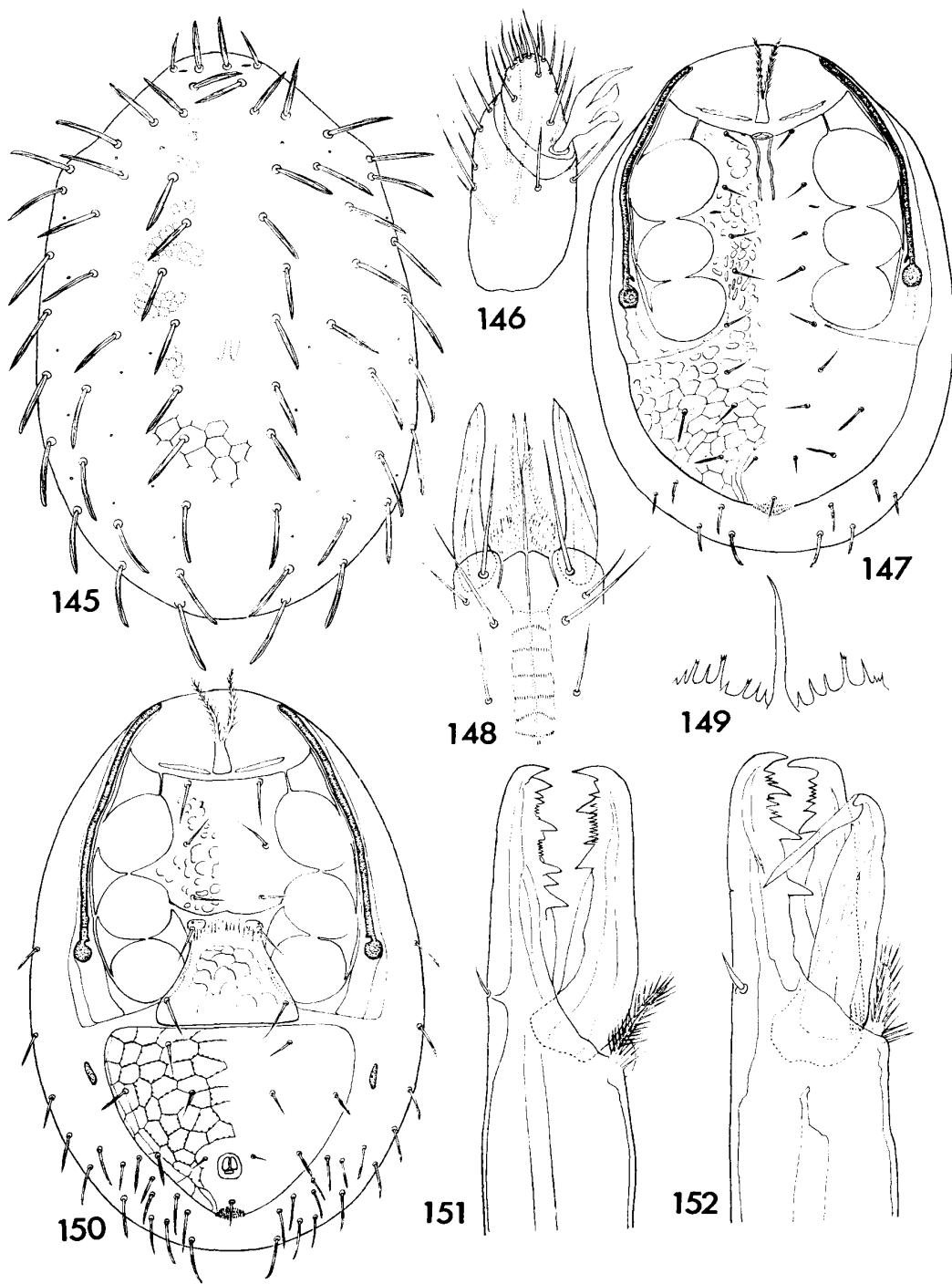
*Parholaspis mordax* PETROVA, 1974, Nauchnye Dokl. vyssh. Shk., (Biol. nauki), 1974 (7): 15; PETROVA, 1977, Opredelitel' obitaiushchikh v pochve kleshchei Mesostigmata, p. 337.

*Specimens examined.* Hokkaido — 1 ♀, Akan, Hokkaido, 17–X–1962, G. IMA-DATÉ; 1 ♀, Kawayu, Hokkaido, 18–X–1968, T. FUJIKAWA; 1 ♀, Nopporo, Hokkaido, 5–VIII–1968, T. FUJIKAWA. Honshu — 1 ♀, Mt. Hakusan, Gifu Pref., 19–V–1967, M. TANAKA. Shikoku — 5 ♀♀, 2 ♂♂, ex litter of *Cinnamomum camphora*, Kashima Is., Ehime Pref., 9–VII–1968, K. ISHIKAWA; 1 ♀, Odamiyama, Ehime Pref., 3–XI–1968, K. I.; 2 ♀♀, Shōdoshima Is., Kagawa Pref., 25–IV–1969, M. YOSHIDA. Kyushu — 4 ♀♀, Hayashida-onsen, Mt. Kirishima, K. I.

*Female.* Length of dorsal shield with a range of 1082–1258  $\mu$ , av. 1157  $\mu$ ; width at the level of coxae IV with a range of 759–813  $\mu$ , av. 794  $\mu$ .

*Dorsum.* Dorsal shield entire, posterior half reticulated, anterior margin rounded. Dorsal shield provided with thirty pair of setae, all the setae being lanceolate. The distribution and form of setae and pores are as shown in Fig. 145. Length of setae; verticals 115  $\mu$ , D3 121  $\mu$ , D4 110  $\mu$ , D5 94  $\mu$ , D10 102  $\mu$ , D12 115  $\mu$ , M1 30 and humerals 128  $\mu$ .

*Venter.* Tritosternum with a pair of plumose laciniae, arising from tritosternal base. A pair of presternal shield narrow though distinct. Sternal shield provided with three pair of simple setae, and not fused with exopodal shield. Metasternal shield oval, free, and provided with a pair of simple setae and pores. Epigynial shield large, with its base wider than the anterior margin, and with a pair of simple setae. Ventri-anal shield subtriangular in outline, covered with a network of punctate lines and bearing four pair of preanal setae, two pairs of which are lanceolate. Interscutal membrane between dorsal and ventral shields bearing sixteen pair of lanceolate setae. Metapodal shields distinct, located as illustrated. Stigmata situated at the level between coxae III and IV and outside of them; peritrematal shield fused with podal



Figs. 145-152. *Parholaspis mordax* PETROVA (145-146, 148-151 female; 147, 152 male). — 145. Dorsum. — 146. Palpal tarsus and tibia. — 147, 150. Venter. — 148. Venter of gnathosoma. — 149. Epistome. — 151-152. Chelicera.

shield.

**Gnathosoma.** Epistome with a long undivided median extension, and with

several short projections on each side. Pedipalp five-segmented; palpal tarsus bearing three-tined apotele, central and basal tines are distally spatulate. Fixed digit of chelicera bearing five large teeth and a number of small teeth, movable digit with two large teeth and a number of small teeth; movable digit (277  $\mu$ ) longer than corniculus (228  $\mu$ ).

**Legs.** Tarsus I with small claws and pulvilli; tarsus I (256  $\mu$ ) much longer than tibia I (180  $\mu$ ). Tarsi II to IV with well developed claws and pulvilli. Tarsus II without spine apically. Length of leg I 965  $\mu$ , II 926  $\mu$ , III 873  $\mu$  and IV 1250  $\mu$ .

**Male.** Length of dorsal shield (two specimens): 1098  $\mu$ , 966  $\mu$ ; width at the level of coxae IV: 745  $\mu$ , 761  $\mu$ .

Dorsal chaetotaxy and reticulated pattern similar to those of female. Presternal shield weakly sclerotized. Genital orifice situated on the anterior margin of sternal shield. Holoventral shield provided with nine pair of setae, two pairs of which are lanceolate, and provided with three perianal setae. Fixed digit of chelicera provided with three large and seven small teeth, while movable digit (200  $\mu$ ) with one large tooth, six small teeth and a sperm transfer organ (85  $\mu$ ). Femur of leg II with a stout thumb-like apophysis; a small spine-like process present on genu II, tibia II and tarsus II. Length of leg I 962  $\mu$ , II 865  $\mu$ , III 737  $\mu$  and IV 1156  $\mu$ .

**Remarks.** This species has hitherto been reported only from the Soviet Far East, and is found for the first time in Japan.

#### *Parholaspis meridionalis* sp. nov.

[Japanese name: Satsuma-yarigehokodani]

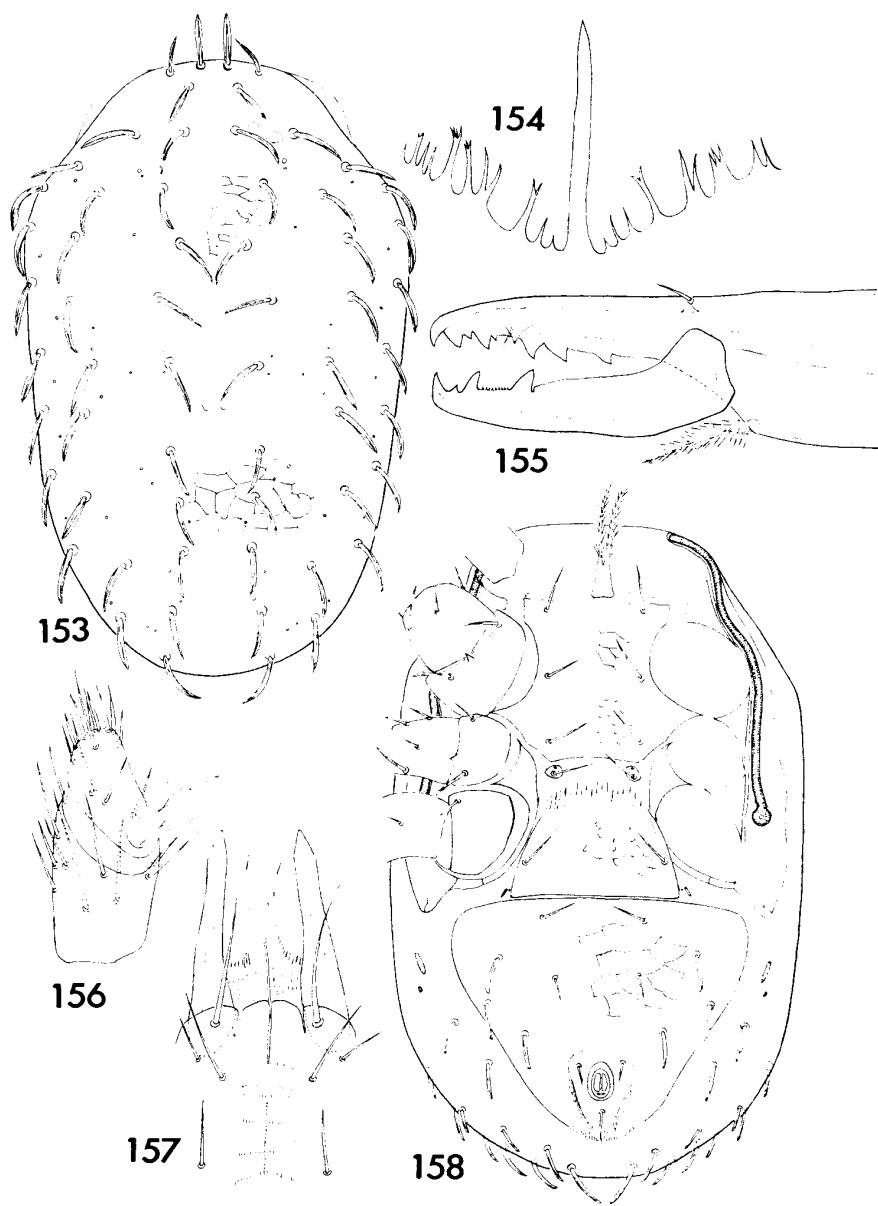
(Figs. 153-158)

**Type-series.** Holotype ♀ (NSMT-Ac 9309): Ishii, Tokushima Pref., 12-IV-1969, M. SAKAI. Paratypes: Shikoku — 1 ♀, the same data as holotype. Kyushu — 2 ♀♀, Cape Satamisaki, Kagoshima Pref., 9-VI-1969, T. FUNAGUMA. Ryukyus — 1 ♀, Kametsu, Tokunoshima Is., Kagoshima Pref., 15-IV-1969, S. TOKUTOMI.

**Female.** Length of dorsal shield (four specimens): 780  $\mu$ , 783  $\mu$ , 819  $\mu$ , 822  $\mu$ ; width at the level of coxae IV: av. 485  $\mu$ .

**Dorsum.** Dorsal shield entire, finely punctate throughout and weakly reticulated, with thirty pair of lanceolate setae. Integumental setae lanceolate, shorter than marginals. The distribution and relative length of setae and pores are as shown in Fig. 153. Length of setae: verticals, D2 69  $\mu$ , D3 74  $\mu$ , D4 72  $\mu$ , D5 64  $\mu$ , D12 77  $\mu$ , M1 48  $\mu$ , L1 79  $\mu$  and Mg1 82  $\mu$ .

**Venter.** Tritosternum well developed, with two strongly pilose laciniae. Presternal shield not conspicuous. Sternal shield reticulated and punctate, and fused with podal shield. Metasternal shield free, each with a long simple seta and pore. Epigynial shield provided with a pair of simple setae, its base being wider than the anterior margin. A pair of small narrow platelets located on integument of the



Figs. 153-158. *Parholaspis meridionalis* sp. nov., female. — 153. Dorsum. — 154. Epistome. — 155. Chelicera. — 156. Palpal tarsus and tibia. — 157. Venter of gnathosoma. — 158. Venter.

postero-lateral side of epigynial shield. Ventri-anal shield subtriangular, with reticulated pattern and five pair of preanal setae, three pairs of which are lanceolate. Interscutal membrane between dorsal and ventral shields with eleven pair of lanceolate setae. Two pair of metapodal shields conspicuous, lying as illustrated. Stigmata situated near the antero-lateral part of coxae IV; peritremes well developed, peritrematal shield fused with podal shield.

**Gnathosoma.** Epistome with a long smooth median extension, and with several short projections on each side. Pedipalp consisting of five segments; palpal

apotele provided with three tines, of which the central and basal ones are distally spatulate. Fixed digit of chelicera with six large teeth, two small teeth and a pilus dentilis, while movable digit with two large teeth and a number of small teeth. Dorsal seta of chelicera spine-like. Movable digit of chelicera (188  $\mu$ ) longer than corniculus (159  $\mu$ ).

**Legs.** Tarsus I with neither claws nor pulvilli; tarsus I (159  $\mu$ ) longer than tibia I (113  $\mu$ ). Tarsi II to IV each with well developed claws and pulvilli. Length of leg I 660  $\mu$ , II 652  $\mu$ , III 595  $\mu$  and IV 958  $\mu$ .

**Male.** Unknown.

**Remarks.** The dorsal setae and epistome of the present species are similar to those of *Parholaspis mordax* PETROVA, 1974, from the Soviet Far East, but it is distinguished from that species by the following points: the fixed digit of chelicera bears five large teeth and a number of small teeth; the leg I has small claws. It may be of some interest to note that the present species has been collected only from the areas facing the Black Current.

#### Genus *Euparholaspulus* PETROVA

*Euparholaspulus* PETROVA, 1967, Nauchnye Dokl. vyssh. Shk., (Biol. nauki), 1967 (5): 20.

Dorsal shield entire, sclerotized and provided with about forty-five pair of simple setae; setae M1 absent. Presternal shields consisting of several pair of platelets. Sternal shield partially fused with endopodal shields and provided with four pair of simple setae. Metasternal shields absent. Epigynial shield wedge-shaped and with a pair of simple setae. Ventri-anal shield subtriangular, with slightly concave anterior margin, bearing three pair of preanal and three perianal setae. Stigmata located near the anterior angles of coxae IV. Peritremes well developed, extending beyond coxae I. Epistome with a median extension. Dorsal seta on fixed digit of chelicera simple. Each tarsus provided with well developed claws and pulvilli.

Type-species: *Euparholaspulus primoris* PETROVA.

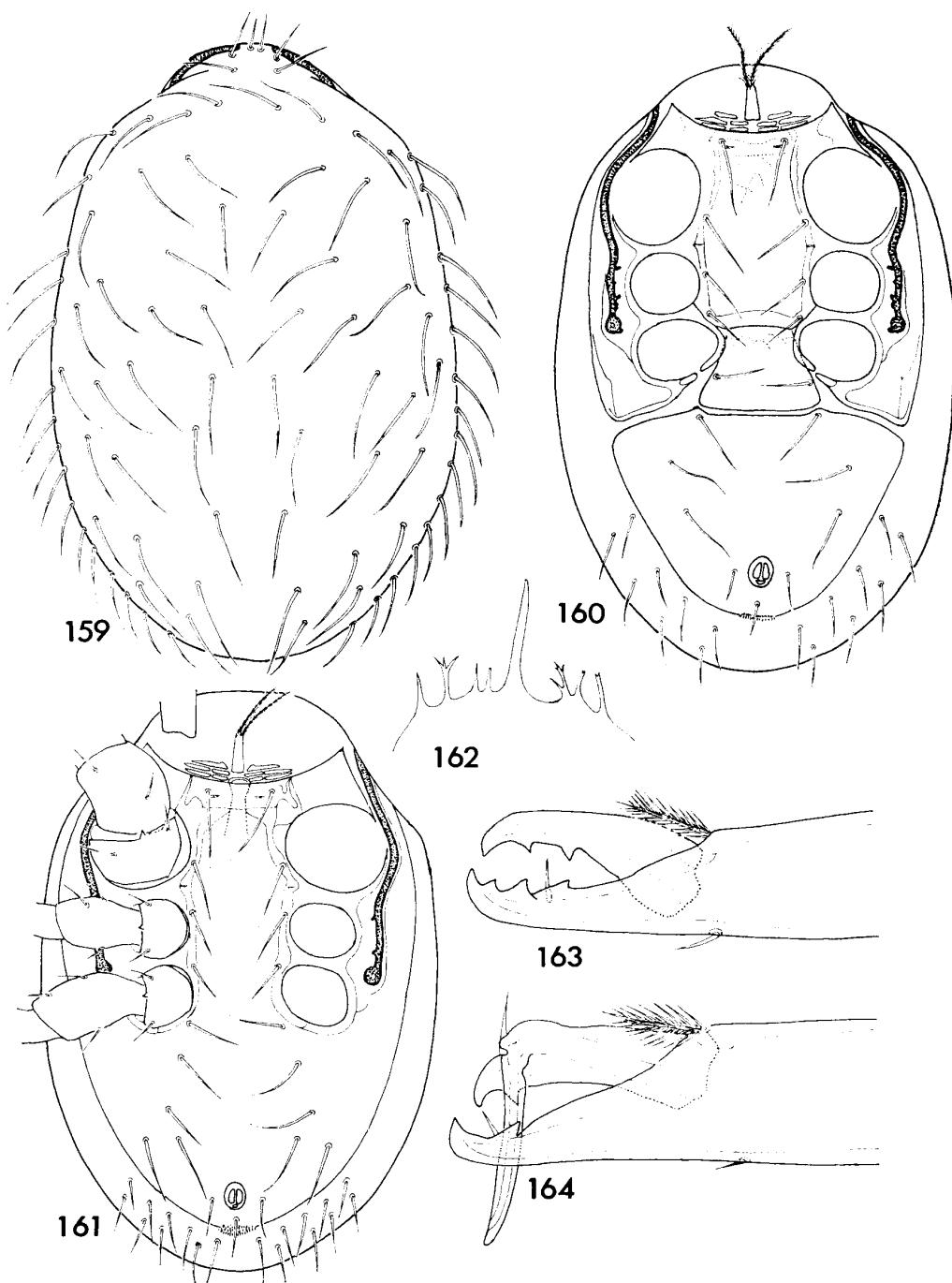
#### *Euparholaspulus primoris* PETROVA

[Japanese name: Hokodanimodoki]

(Figs. 159-164)

*Euparholaspulus primoris* PETROVA 1967, Nauchnye Dokl. vyssh. Shk., (Biol. nauki), 1967 (5): 20; PETROVA, 1977, Opredelitel' obitaiushchikh v pochve kleshchei Mesostigmata, p. 333.

**Specimens examined.** Honshu — 2 ♀♀, ex litter of *Fagus crenata*, Mt. Gassan, Yamagata Pref., 31-X-1968, K. NIJIMA; 2 ♀♀, Mt. Shiga, Nagano Pref., 24-VIII-1968, K. ISHIKAWA; 2 ♀♀, Gozamisaki, Mie Pref., 28-II-1969, K. I. Shikoku — 2 ♀♀, 1 ♂, Mt. Omogo, Ehime Pref., 7-VIII-1969, K. I. Tsushima Islands — 1 ♀, 1 ♂, Kamiagata, Tsushima Is., 17-X-1968, J. AOKI.



Figs. 159–164. *Euparholaspulus primoris* PETROVA (159–160, 162–163 female; 161, 164 male).  
 — 159. Dorsum. — 160–161. Venter. — 162. Epistome. — 163–164. Chelicera.

**Female.** Length of idiosoma: av.  $1130\ \mu$ ; length of dorsal shield  $970$ – $1200\ \mu$ , av.  $1125\ \mu$ ; width at the level of coxae IV  $650$ – $770\ \mu$ , av.  $730\ \mu$ .

**Dorsum.** Dorsal shield entire, sclerotized, the anterior margin slightly rounded.

Dorsal shield provided with forty-five pair of simple setae; setae M1 absent. The distribution of setae is as shown in Fig. 159. Length of setae: verticals 63  $\mu$ , D2 80  $\mu$ , D5, D6 80  $\mu$ , D11 85  $\mu$  and humerals 82  $\mu$ .

**Venter.** Tritosternum with a pair of strong pilose laciniae which are much longer than tritosternal base. Presternal shield fragmented into five pair of narrow platelets. Sternal shield reticulated, fused with metasternal and endopodal shields, and with four pair of simple setae. Epigynial shield wedge-shaped and with a pair of long simple setae. Ventri-anal shield subtriangular, bearing three pair of preanal and three perianal setae. Interscutal membrane between epigynial and ventri-anal shields provided with two pair of narrow platelets. Stigmata located near the anterior angles of coxae IV. Peritremes well developed, extending beyond coxae I. Peritrematal shields partially fused with exopodal shields.

**Gnathosoma.** Epistome with a median extension, long, smooth, and with several spines on each side. Pedipalp five-segmented; palpal tarsus with three-tined palpal apotele. Fixed digit of chelicera provided with three teeth and a pilus dentilis; movable digit (88  $\mu$ ) approximately as long as corniculus, and with two teeth. Dorsal seta on fixed digit simple.

**Legs.** Each tarsus provided with well developed claws and pulvilli. Tarsus I (250  $\mu$ ) much longer than tibia I (165  $\mu$ ). Tarsus II with a pair of stout spurs at the distal portion. Length of leg I 968  $\mu$ , II 895  $\mu$ , III 700  $\mu$  and IV 950  $\mu$ .

**Male.** Length of dorsal shield 930–1050  $\mu$ , av. 980  $\mu$ ; width of dorsal shield at the level of coxae IV av. 630  $\mu$ .

Dorsal chaetotaxy and ornamentation similar to those of female. Genital orifice located on the anterior margin of sternal portion. Holoventral shield with nine pair of simple setae and three perianal setae. Fixed digit of chelicera with a tooth and a pilus dentilis. Movable digit with a tooth and a sperm transfer organ. Femur II with a stout thumb-like spur; a small spur each on genu and tibia. Length of leg I 905  $\mu$ , II 820  $\mu$ , III 660  $\mu$  and IV 885  $\mu$ .

**Remarks.** The genus *Euparholaspulus* was erected by PETROVA (1967) on the basis of *E. primoris* from the Soviet Far East, and is mainly characterized by the following features: dorsal shield with heavy sclerotization and lacking in the metasternal shield. In Japan, the mite has been found in Honshu, Shikoku and the Tsushima Islands.

## VII. Summary

In the present paper the taxonomic section of the studies on the family Parholaspidae of the suborder Mesostigmata (Acari) from Japan is dealt with. It was carried out on the basis of more than 2,500 slides prepared from materials taken at about 550 localities distributed all over Japan, from Hokkaido in the north to Iriomote, one of the southernmost islands of the Ryukyus. As the result, seven genera and twenty-seven species of parholaspid mites have been known to occur in Japan. Of

these, one genus and nineteen species, six of which were already described in his previous papers, are the taxa established by the author himself and the remaining eight are newly recorded from Japan.

### VIII. Acknowledgements

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